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Yin-Chun Huang

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EXAMINER

VO, QUANG N

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/695,327	HUANG ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Quang N. Vo	2625	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 05 March 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-13 and 18-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 and 18-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/05/09 has been entered.

### ***Response to Arguments***

Regarding claim 1, Applicant's argument is Maurer's chrominance channels Cb and Cr are processed separately from the luminance Y channel, they would not be understood to disclose recombining the full color level of the color element, as recited by claim 1, since Maurer's processes associated with Cb, Cr and Y are combined to produce the output image.

In response: Maurer discloses recombining the full color level of the color element by combining the reduced color level image with the pattern (e.g., the reconstructed chrominance channel (color element) are interpolated to their original resolution if the chrominance channels were downsampled during compression (block 156), column 3, lines 47-51, column 3, lines 47-51. Note: Examiner interprets each Y, Cr, and Cb is color element in YCbCr color space, since the luminance channel is reconstructed according to the lossless standard. Thus the only channel left to reconstruct is chrominance channel (color element) to have full color level, figure 2).

Applicant's arguments with respect to claims 6-13, 18-21, and 23-25 have been considered but are moot in view of the new ground(s) of rejection.

***Claim Rejections - 35 USC § 101***

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-13, 26-29 are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent<sup>1</sup> and recent Federal Circuit decisions<sup>2</sup> indicate that a statutory “process” under 35 U.S.C. 101 must (1) be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. In particular, claims 1, 6 and 8, while reciting “decreasing/reducing a color level/gray scale...”, “composing a pattern...”, “recombining the full color level...” can be done either by hardware or software/program, does not define a “hardware/apparatus” and is thus non-statutory for that reasons, **recalling *In re Bilski***. A program can range from paper on which the program is written, to a program

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<sup>1</sup> *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

<sup>2</sup> *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

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simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program/software on “hardware/apparatus/device” in order to make the claim statutory. All dependence claims of claims 1, 6 and 8 are also rejected because it depends on independence rejected claims.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-5, 22, 26, 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Maurer et al. (Maurer) (US 6,650,773).

Regarding claim 1, Maurer discloses a method for reducing image noise (e.g., Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 45-48. Note: examiner interprets image noise is any kind of noise or artifacts in the image.) in a scanned image, comprising: decreasing a color level of a color element of the scanned image by reducing a number of bits of a full color level of the color element to form a reduced color level image (e.g., the luminance channel is bit-depth truncated (block 106), an 8-bit luminance channel may be truncated to five bits, figure 1, column 2, lines 44-51.

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Note: examiner interprets color is combined of chrominance and luminance by convention. Thus either chrominance (color element) or luminance (color element) reduce, the color level image must reduce, for example:  $C = A + B$ , either A or B reduced, C must reduce. In this case, the luminance channel is bit-depth truncated (bit depth reduced). Therefore the color level reduced); **composing a pattern** (e.g., pattern 2 x 2 from down-sampling of block 110, figure 1, column 2, lines 58-65) comprising the color element having less color level than the full color level (e.g., the reconstructed chrominance channel (color element) are interpolated to their original resolution if the chrominance channels were downsampled during compression (block 156), column 3, lines 47-51. Note: examiner interprets the pattern used to downsampled the chrominance (color element) to reduce resolution (column 2, lines 61-64); and later the chrominance is reconstructed to original resolution (column 3, lines 47-51). Thus, the pattern must have less color level than chrominance level because after downsampled, the chrominance level just reduced resolution (chrominance level reduced)); recombining the full color level of the color element by combining the reduced color level image with the pattern (e.g., the reconstructed chrominance channel (color element) are interpolated to their original resolution if the chrominance channels were downsampled during compression (block 156), column 3, lines 47-51, column 3, lines 47-51).

With regard to claim 2, Maurer discloses wherein the reduced color level image and the pattern are combined using a bit enhanced method (e.g., bit-depth truncation, block 106, column 2, lines 44-48. Note: examiner interprets that because Bit-depth of

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the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable. Thus bit-depth truncation is a bit enhanced method).

Regarding claim 3, Maurer and Ide combined disclose wherein combining the reduced color level image with the pattern restores the pixel to include a same number of bits of the color element as before the full color level was decreased (e.g., when the low-order bits are truncated, a reduction in the number of gray levels occurs. However, the lost gray levels are recovered by means of pseudo-representation by the multiple gradation level converter 33, paragraph 0046).

With regard to claim 4, Maurer discloses wherein the pattern comprises a halftone pattern (e.g., 2x2 pattern from down-sampling, column 2, lines 58-65).

With regard to claim 5, Maurer discloses wherein the number of bits reduced from the full color level is set to an image noise level (e.g., Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 45-48. Note: examiner interprets image noise is any kind of noise or artifacts in the image.).

With regard to claim 22, the subject matter is similar to claim 5. Therefore claim 22 is rejected as set forth above for claim 5.

Regarding claim 26, Maurer discloses wherein the scanned image comprises three color elements, and wherein the pixel comprises at least one of the three color

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elements (e.g., Y, Cb, and Cr in YCbCr color space or Red, green, and blue in RGB color space, column 2, lines 10-30).

Regarding claim 27, Maurer discloses wherein the three color elements comprise a red color element, a blue color element, and a green color element (e.g., Red, green, and blue in RGB color space, column 2, lines 10-30).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 6-13, 18-21, 23-25, and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maurer et al. (Maurer) (US 6,650,773) in view of Seroussi et al. (Seroussi) (US 5,764,374).

Regarding claim 6, Maurer discloses a method for reducing image noise (e.g., where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 46-48. Note: examiner interprets image noise is any kind of noise or artifacts in the image.), comprising: reducing gray scale of one or more pixels of the image by reducing a number of bits of gray scale image data from each of the one or more pixels (e.g., the luminance channel is bit-depth truncated (block 106). Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable, column 2, lines



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44-47); and restoring the gray scale of the one or more pixels using a halftone pattern comprising a matrix (e.g., FIG. 2 illustrates a method of reconstructing the digital image from the compressed luminance and chrominance information in the file, column 3, lines 38-50. **Note:** since image level includes luminance and chrominance and the intensity of image level represents gray scale level by convention; and since luminance is reconstructed lossless, column 3, lines 44-45. Thus restoring the image level (gray scale) only depends on chrominance channel; and the reconstructed (restored) chrominance channel are interpolated to their original resolution if the chrominance channel were downsampled (by 2x2 matrix or halftone pattern) during compression, column 3, lines 47-50. Therefore restoring image level (gray scale) of the one or more pixels is using a halftone pattern (e.g., interpolation may be performed by pixel replication (halftone pattern), column 3, lines 49-50).

Maurer does not explicitly disclose wherein a number of rows and a number of columns of the matrix correspond to the number of bits of gray scale image data subtracted from the one or more pixels.

Seroussi discloses wherein a number of rows and a number of columns of the matrix correspond to the number of bits of gray scale image data subtracted from the one or more pixels (e.g., Gray-scale images are considered as two-dimensional arrays (matrix with number of rows and number of columns) of intensity values, digitized to some number of bits, column 1, lines 52-53. Note: Since the two dimensional arrays have number of rows and number of columns and digitize to (corresponding to) some

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number of bits. Thus number of rows and a number of columns of the array (matrix) correspond to the number of bits of gray scale image).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Maurer to include wherein a number of rows and a number of columns of the matrix correspond to the number of bits of gray scale image data subtracted from the one or more pixels as taught by Seroussi. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Maurer by the teaching of Seroussi to reconstruct image effectively and have better image quality.

With regard to claim 7, Maurer differs from claim 7, in that he does not explicitly teach the color level of the pattern depends on the number of bits reduced from the full color level.

Maurer discloses in general, the luminance channel has the bit depth may be truncated down about 2 bits (column 2, lines 44-51); and each chrominance channel may be down-sampling by factor of 2 by replacing 2x2 matrix of pixels by a single pixel (column 2, lines 60-64); and since color is combined of chrominance channel and luminance channel. Thus number of bits reduced can set equal to the size of the pattern like 2x2 matrix.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have recognized Maurer is having teaching the color level of the pattern depends on the number of bits reduced from the full color level, or at least obvious to provide functional part for performing the color level of the pattern depends

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on the number of bits reduced from the full color level.

Regarding claim 8, Maurer discloses a method for reducing image noise (e.g., Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable (e.g., small contouring artifacts might be barely noticeable), column 2, lines 45-48. Note: examiner interprets image noise is any kind of noise or artifacts in the image.), comprising: reducing a full image level of a color element of a pixel of the image by decreasing a number of bits of the color element from according to the image noise (e.g., Bit-depth of the luminance channel (color element) is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable, column 2, lines 44-47. Note: examiner interprets image level is color level and color is combined of chrominance and luminance by convention. Thus either chrominance or luminance reduce, the color level image must reduce, for example:  $C = A + B$ , either A or B reduced, C must reduce. In this case, the luminance channel (color element) is bit-depth truncated (bit depth reduced). Therefore the color level reduced); composing a halftone pattern (e.g., pattern 2 x 2 from down-sampling of block 110, figure 1, column 2, lines 58-65) comprising a reduced image level of the color element (e.g., the luminance channel has the bit depth may be truncated down about 2 bits (column 2, lines 44-51); and each chrominance channel may be down-sampling by factor of 2 by replacing 2x2 matrix of pixels by a single pixel, column 2, lines 60-64); and recombining an image level of the color element of the pixel using the halftone pattern (e.g., figure 2, column 3, lines 37-51).

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Maurer does not explicitly disclose composing a halftone pattern corresponding to the decreased number of bits.

Seroussi discloses composing a halftone pattern corresponding to the decreased number of bits (e.g., Gray-scale images are considered as two-dimensional arrays (halftone pattern) of intensity values, digitized to some number of bits, column 1, lines 52-53).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Maurer to include a halftone pattern corresponding to the decreased number of bits as taught by Seroussi. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Maurer by the teaching of Seroussi to reconstruct image effectively and have better image quality.

With regard to claim 9, Maurer discloses wherein a number of bits of the color element in the recombined image level is the same as a number of bits of the color element in the full image level (e.g., the reconstructed chrominance channels are interpolated to their original resolution if the chrominance channels were downsampled during compression (block 156). The interpolation may be performed by pixel replication, column 3, lines 47-51. Note: Examiner interprets a chrominance channel and a luminance channel are color elements).

With regard to claim 10, Maurer differs from claim 10 in that he does not explicitly teach wherein the halftone pattern comprises a matrix having a number of rows equal to the decreased number of bits.

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Since Maurer discloses in general, the luminance channel has the bit depth may be truncated down about 2 bits (column 2, lines 44-51); and each chrominance channel may be down-sampling by factor of 2 by replacing 2x2 matrix of pixels by a single pixel (column 2, lines 60-64); and since color is combined of chrominance channel and luminance channel. Thus number of bits reduced can set equal to the size of the pattern like 2x2 matrix for color level, which is combined of chrominance and luminance.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have recognized Maurer is having teaching wherein the halftone pattern comprises a matrix having a number of rows equal to the decreased number of bits, or at least obvious to provide functional part for performing wherein the halftone pattern comprises a matrix having a number of rows equal to the decreased number of bits.

With regard to claim 11, Maurer discloses wherein the halftone pattern comprises a matrix having a number of column (e.g., chrominance channel may be down-sampled by a factor of 2 and pattern 2x2 from down-sampling, column 2, lines 60-65) equal to the decreased number of bits the luminance channel has the bit depth may be truncated down about 2 bits (column 2, lines 44-51).

With regard to claim 12, Maurer discloses further comprising displaying the image including the recombined image level on a computer monitor (e.g., block 160, figure 2).

With regard to claim 13, Maurer discloses further comprising filling out missing

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codes of the pixel using a bit-enhanced method (e.g., the interpolation may be performed by pixel replication, column 3, lines 47-51).

Referring to claim 18:

Claim 18 is the apparatus claim corresponding with method steps in claim 8.

Therefore claim 18 is rejected as set forth above for claim 8.

Referring to claim 19:

Claim 19 is the apparatus claim corresponding with method steps in claim 9.

Therefore claim 19 is rejected as set forth above for claim 9.

With regard to claim 20, the subject matter is similar to claims 10 and 11.

Therefore claim 20 is rejected as set forth above for claims 10 and 11.

With regard to claim 21, the subject matter is similar to claim 9. Therefore claim 21 is rejected as set forth above for claim 9.

With regard to claim 23, the subject matter is similar to claim 7. Therefore claim 23 is rejected as set forth above for claim 7.

With regard to claim 24, Maurer discloses wherein one or more of the full image level, the reduced image level, and the image level comprise a color level (e.g., the digital image is made up of a plurality of pixels, each pixel being represented by an n-bit word. In a typical 24-bit word representing RGB color space, for instance, eight bits represent a red component, eight bits represent a green component and eight bits represent a blue component, column 2, lines 7-14. Note: examiner interprets that each color component has 8 bits and the combination of color components to represent a full image level, and the reduced image level.).

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Regarding claim 25, Maurer discloses wherein one or more of the full image level, the reduced image level, and the image level comprise a gray level (e.g., the digital image is made up of a plurality of pixels, each pixel being represented by an n-bit word. In a typical 24-bit word representing RGB color space, for instance, eight bits represent a red component, eight bits represent a green component and eight bits represent a blue component, column 2, lines 7-14. Note: examiner interprets that each color component has 8 bits, which has 255 gray scale for each color component).

Regarding claim 28, Maurer discloses wherein the full image level of the color element and the recombined image level of the color element comprises a gray level (e.g., luminance channel, column 2, line 44).

Regarding 29, Maurer discloses wherein the full image level is reduced by decreasing a number of bits of the gray level (e.g., The luminance channel is bit-depth truncated (block 106). Bit-depth of the luminance channel is reduced to discard visually unimportant information to a level where visual artifacts are virtually unnoticeable, column 2, lines 44-47).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang N. Vo whose telephone number is (571)270-1121. The examiner can normally be reached on 7:30AM-5:00PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David K. Moore can be reached on (571)272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Q. N. V./  
Examiner, Art Unit 2625

/David K Moore/  
Supervisory Patent Examiner, Art Unit 2625